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Windbreaks for the Peace River Region

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CANADA DEPARTMENT OF AGRICULTURE
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INTRODUCTION

Windbreaks are a valuable asset on farms in the Prairie Provinces. They provide shelter for livestock and gardens, contribute to the attractiveness of the farmstead, and add to the comfort of living. As much as one-third less fuel is necessary to heat a home that is protected by windbreaks. Too often excellent stands of native trees have been removed and building sites established without wind protection. Where natural shelters have been left, they should be protected from livestock and poultry.

The heavy clay subsoil and climate at the Beaverlodge Experimental Farm and throughout the Peace River region create less favorable conditions for the growing of woody plants than those generally prevailing in the more southerly regions of the Prairie Provinces. Hardy, dependable species must be chosen with care and the transplanted trees must receive the attention and culture that will enable them to mature into sturdy, serviceable forms of shelter.

Although much of the information contained in this bulletin is applicable to other northern sections of the Prairie Provinces it is intended primarily for use in the Peace River region. The information on recommended varieties and cultural practices is based on the normal range of conditions in this region. There are exceptions to these conditions, such as the deeper, light-textured soils in the High Prairie district, where some species do well that are borderline in adaptability elsewhere. For such localities the prospective tree planter should note the kinds of trees that thrive in the neighborhood and should also consult horticultural authorities.

Appreciation is extended to Messrs. P. D. McCalla and W. Lobay of the Alberta Department of Agriculture for assistance in the preparation of this bulletin.

DESCRIPTION OF WINDBREAK SPECIES

Suitable Trees and Shrubs

Common Caragana. -- Excels all other shrubs in adaptability; easily established, drought resistant, relatively long lived and hardy even in the most difficult seasons. Its dense, shrubby growth provides excellent protection for the lower portion of the windbreak; principally used for a snow trap and for the outside hedgerow of windbreaks; mature height 8 to 12 feet.

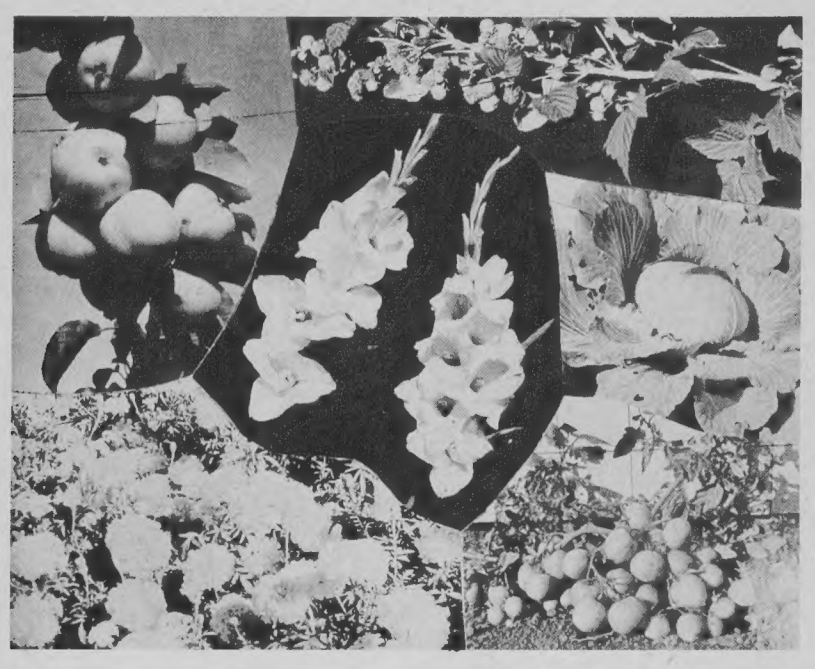

Fig. 1. - An abundance of horticultural crops and plants can be grown in locations protected by sturdy windbreaks.

Late Lilac. -- About the same form and height as the caragana and may be used for the same purpose; flowers rosy lilac, borne in small, dense panicles; hardy but probably not so long lived as the caragana and does not require so much pruning; sometimes incorrectly referred to as Chinese lilac.

Hungarian Lilac. -- Similar to the late lilac but more upright; flowers lilac-violet, very pleasingly fragrant and larger than late lilac.

Northwest Poplar. -- Very quick growing and hardy but not long lived; a minor tendency to sucker but does not shed cotton like some poplars; the most satisfactory poplar for northern Alberta; does well in low spots too wet for other trees;

mature height to 50 feet.

Green Ash. -- Slow growing but hardy and long lived; sometimes subject to spring frost damage in low-lying locations; mature height 30 feet.

Siberian Larch. -- A relative of the native tamarack; very quick growing, drought resistant, totally hardy; attractive in all seasons; broad base but narrow crown (close spacing advisable); loses needles in autumn; mature height 40 feet.

Fig. 2. - The Siberian larch is a quick growing, hardy species and should be more widely planted. This planting at the Beaverlodge Experimental Farm is 16 years old.

White Spruce. -- Native; best permanent windbreak tree; ascending branches; mature height 40 feet.

Colorado Spruce. -- Branches horizontal and whorled; mature height may be less than white spruce. Some of the seedlings vary in color from blue-green to silvery light blue.

Scotch Pine. -- Similar to the jack pine but does not lose the lower branches so early; attractive when young; vigorous grower; mature height 40 feet.

Lodgepole Pine. -- Native; superior to jack pine; darker green foliage, longer needles, barbed cones pointing toward center of tree, more upright; mature height 40 feet.

Jack Pine. -- Native; good stands in some Peace River windbreaks; inferior to lodgepole pine because of its early tendency to ragged, open habit; grows to 40 feet.

Willows. -- According to results at the Beaverlodge Experimental Farm willow species have a fairly limited use in windbreaks of the Peace River region because of poor drought tolerance. However, several good stands have been observed

Fig. 3. The native white spruce is one of the best windbreak species. This stand of trees, located on the farm of Mr. Peter Kronewitt of Berwyn, was planted in 1915 and is still in a vigorous condition.

throughout the region where soil and moisture conditions were better than normal. Their use is generally restricted to locations near dugouts, creeks, and potholes and in windbreaks where the soil is too wet for caragana and most other trees to become established.

Several varieties of Russian willow may be used. Among them is the silky white (silver) willow, with its green leaves showing white and silky underneath, as the name implies. The yellowstem white (golden) willow adds much to the winter landscape with its bright golden twigs. The sharpleaf willow makes a winter show of green branches. These species will achieve a height of close to 30 feet even though they may kill back somewhat at times. Native species are not satisfactory except for shorelines where other willows have winterkilled.

Suitable Fruit-Bearing Species

The inside of the windbreak can be dressed up with a number of fruit-bearing small trees and large shrubs. These plants may also be grown in partially protected locations, as in the lee of farmsteads, in single or double rows and in pure or mixed stands. They provide a beautiful array of fragrant spring bloom. The colorful autumn fruit of certain species provides food for the farm family and attracts many game birds.

Species such as the native choke cherry, pin cherry and saskatoon which have a tendency to spread by root sprouts should be allowed sufficient space to form a thicket.

Amur Choke Cherry. -- Small, narrow tree to 12 feet; very hardy; white blossoms in spring, black inedible cherries in autumn; papery, orange-brown bark is highly ornamental in the winter.

Fig. 4. - Fruit-bearing species in windbreaks create interest and are valuable to humans and wildlife. The native saskatoon (left) and the silver buffalo-berry (right) are two of a number of species used for these purposes.

Common Choke Cherry. -- Native; well adapted to cultivation; tall shrub to 12 feet; fragrant white blossoms in spring and heavy crop of cherries in autumn.

European Bird Cherry. -- Very hardy, small tree to 14 feet; broad head; blooms profusely in May, very fragrant; fruit like common choke cherry, inedible.

European Mountain Ash. -- Tall, narrow shrub to 25 feet; bears heavy crops of brilliant red berries retained well into the winter and relished by birds; without adequate protection may kill back in some years.

American Mountain Ash. -- Similar to the European mountain ash but promises to be hardier.

Greenes Mountain Ash. -- Hardy, native shrub to 8 feet; bears heavy crops of berries.

Fireberry Hawthorn. -- Hardy, native shrub to 10 feet; tends to sucker; heavily armed with long thorns; white blossoms in June, red berries in autumn.

American Cranberrybush. -- Sometimes called highbush cranberry; native shrub to 10 feet along some rivers and lakes in the Peace River region; flowers in flat clusters, fragrant; fruit bright red and excellent for jelly. The mooseberry, very common in damp woods, does not grow so tall and the fruit clusters are much

smaller.

Manchurian Crabapple. -- Small tree to 15 feet; fragrant white blossoms followed by scarlet fruits too small for culinary use; trees uniform in size and hardiness and do not vary in this respect like their Siberian cousins.

Pin Cherry. -- Native tall shrub or small tree which takes readily to cultivation; blossoms white; red fruit makes excellent jelly. Seedlings or root sprouts from different patches should be planted to ensure cross-pollination.

Roses. -- Several vigorous, tall-growing varieties may be used in mixed plantings. Both blossoms and hips are ornamental. Suitable varieties are Altai Scotch (creamy-white, single), Tetonkaha, Yatkan and Lac la Nonne (pink, semi-double).

Saskatoon. -- Excellent for utility and beauty; may be transplanted readily from the wild by plowing up a patch and selecting foot-long, abundantly fibrous-rooted cuttings with a 3-inch upright stub.

Silver Buffalo-berry. -- Fully hardy, silver-leaved shrub, native to southern Alberta; mature height 10 feet; female trees bear heavy crops of red or yellow berries held into the winter.

Tatarian Honeysuckle. -- A hardy hedge plant, producing attractive blossoms in the spring and colorful berries in the autumn.

Unsuitable Species

Russian Poplar. -- Vigorous and hardy; short lived; suckers extensively and female trees shed objectionable cotton, otherwise satisfactory.

Balsam Poplar. -- Native; also known as black poplar and "Balm of Gilead"; quick growing but very short lived and lacks drought resistance; sends out suckers, and female trees shed cotton.

Box-elder (Manitoba Maple). -- Quick growing when young but lacks winter hardiness and seldom attains full height; subject to severe injury from insects.

American Elm. -- Individual trees show natural variation in vigor; most seedlings lack hardiness.

Others: -- Several other species of trees and shrubs suitable in other parts of Alberta are not suited for windbreaks under Peace River conditions. These include all types of plums, Siberian crabapple, common lilac, laurel willow, Chinese bush cherry, sand cherry, and Manchu cherry.

ARRANGEMENT OF TREES IN THE WINDBREAK

A plan drawn to scale is helpful in outlining the arrangement of trees in windbreaks and the location of windbreaks in relation to other areas of the farmstead. Usually the Government Departments that supply the trees require such a sketch before accepting an order. Squared paper is ideal for this purpose and whenever possible the plan should be made to scale. It is important to remember that windbreaks should be at least 100 feet from roads or buildings to prevent them from becoming blocked with snowdrifts.

Where narrow cultivating equipment is available the rows may be spaced 6 to 8 feet apart, the trees within the rows having the same spacing. However, if only field equipment is available, the rows should be set farther apart, usually 4 feet more than the width of the cultivator. This wider spacing between rows

allows closer spacing of trees within the rows, usually 4 feet. Siberian larch might be planted as close as 3 feet. Caragana should be spaced 1 foot apart within the row. Where lilacs or other shrubs are used instead of the caragana they should be planted about 3 feet apart.

The suggested windbreak design includes three or four rows of deciduous trees on the outside and one or more rows of evergreens on the inside. The deciduous trees and evergreens need to be separated by a 16' to 20-foot strip which should be permanently cultivated. This serves as a feeding area for shallow roots to secure moisture and nutrients. The strip also prevents the undesirable mixing of evergreen and deciduous trees, thus overcoming disfiguration of the evergreens. Permanently cultivated strips, 12 to 16 feet wide, should also be maintained on both sides of the windbreak.

If the Northwest poplar, which is a vigorous grower, is planted at a 6- or 8-foot spacing from the slower-growing, longer-lived trees, it will quickly encroach on them. It is therefore a sound practice to remove them after about 15 years.

Suggested species for a 6-row windbreak with a cultivated strip are as follows:

First row -- Caragana
Second row -- Green ash
Third row -- Siberian larch or green ash
Fourth row -- Northwest poplar or Siberian larch
Cultivated strip
Fifth row -- White spruce or pine
Sixth row -- Colorado spruce or white spruce

CARE AND PLANTING OF THE YOUNG TREES

Care of Plants on Arrival. -- It should be borne in mind that trees often come a great distance and usually in high temperatures. They should therefore be either planted at once or the roots submerged in water for one day and then "heeled in" in a shady location.

"Heeling in" begins with digging a trench to the depth of the shovel with one wall at a 45-degree angle, (Fig. 5). The seedlings are then spread out against the sloped wall and the roots covered and tramped to prevent drying out. They may be held in this manner for a week or so.

Cuttings should be soaked for several hours to one day after arrival. Further treatment is discussed in the following section.

Planting Procedures. -- NEVER ALLOW THE ROOTS TO BECOME DRY DURING THE PLANTING OPERATION. This is especially important with evergreens for if their roots are allowed to dry the plants are useless. The seedlings should be carried in a pail with sufficient water to cover the roots at all times.

There are several practical methods of planting trees and the method employed will depend on the number to be planted. Relatively small numbers may be planted by hand. In this operation the shovel is inserted to its full depth into the soil and the handle is pushed forward to make an opening. The seedling is inserted into the opening with one hand and the shovel carefully withdrawn with the other (Fig. 5). The seedlings should be planted an inch or two deeper than they grew in the nursery. After planting, the soil must be firmly tramped with the heel of a heavy boot to ensure close contact between the soil and roots. The ball of the foot should not be used because it does not give sufficient pressure. The

tree is properly planted if it is difficult to pull out. Watering is required if the soil is dry. After the water has soaked away, dry soil should be placed around the tree to prevent baking.

If large numbers of trees are being planted the plow may be used. A furrow several hundred feet long is plowed; the plants are placed upright against the landside of the furrow and moist soil is drawn over the roots as they are lined out. After the seedlings are set out in this manner the soil is plowed back into the furrow and packed by running the tractor wheel alongside the trees. This method of planting is particularly suited to caragana seedlings.

In Alberta planting machines owned by municipalities are available for planting large numbers of trees. Arrangements for their use must be made well in advance of planting.

Cuttings are not treated in the same manner as seedlings, since losses are usually heavy if they are set out directly in the windbreak. It is therefore advisable to plant the cuttings in a nursery row in the garden and set out the rooted plants the following spring, a procedure which assures a complete stand of windbreak trees.

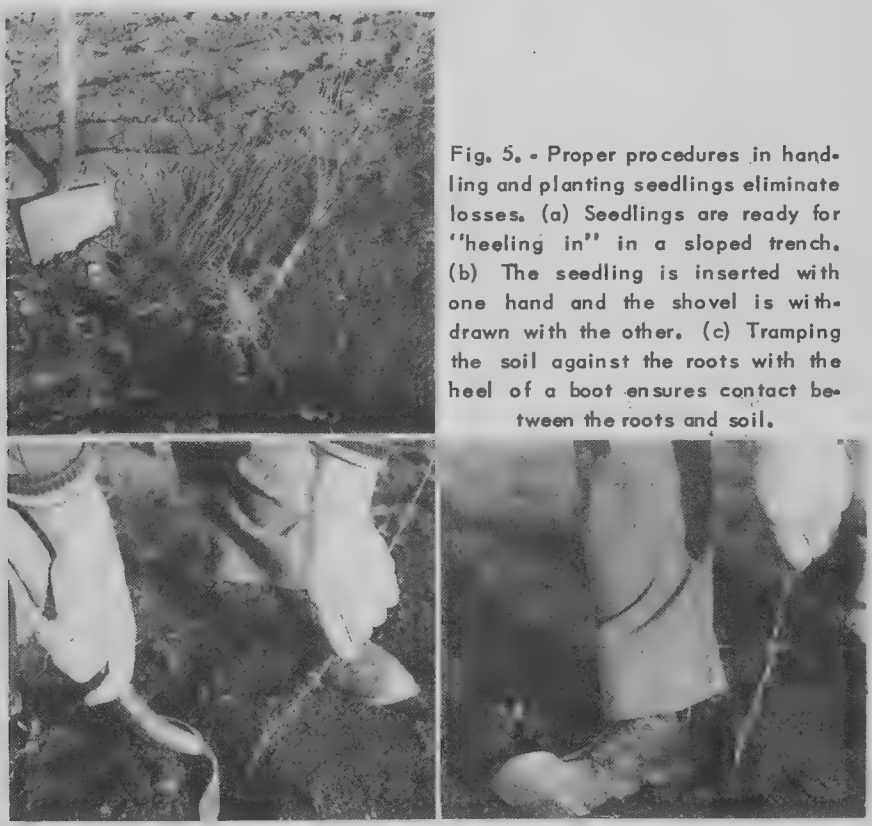

Fig. 5. - Proper procedures in handling and planting seedlings eliminate losses. (a) Seedlings are ready for "heeling in" in a sloped trench. (b) The seedling is inserted with one hand and the shovel is withdrawn with the other. (c) Tramping the soil against the roots with the heel of a boot ensures contact between the roots and soil.

After soaking, the cuttings should be planted 6 inches apart in a trench made at a 45-degree angle. Only the top bud of the cutting should project above the ground. The soil should be well packed with the heel for the whole length of the cutting. As with seedlings, the cuttings must not be allowed to dry out at any time.

CARE OF WINDBREAKS

Soil Preparation and Cultivation. -- It is essential to summerfallow the land until all weeds are eradicated. This will take one or more years and will build up a reserve of moisture. Planting should not be attempted until all traces of creeping-rooted grasses are removed. Brome grass can be one of the most troublesome plants in Peace River windbreaks.

If the narrow spacing between rows is chosen, clean cultivation must be maintained until the tree growth is sufficiently dense to shade the ground and suppress weeds. Where the spacing is wide enough to accommodate field equipment, the soil should be kept black at all times. The permanently cultivated strips in the middle and on either side of the windbreak must also be maintained free from weeds.

The duck-foot cultivator is preferred to the double disk since the pulverizing action on the soil is not so great. However, the cultivator will damage and tear up the feeder roots if the depth of cultivation exceeds 3 or 4 inches. Tractor-mounted cultivators are well suited for the cultivation of windbreaks.

The windbreak should be inspected annually for brome grass or couch grass. These should be thoroughly weeded with a digging fork before they spread and quickly ruin the windbreak.

Fig. 6. - Clean border cultivation, as practised on the farm of Mr. T. F. Ritchie of Berwyn, promotes vigorous tree growth by eliminating weeds which rob the soil of valuable moisture and nutrients.

Mulching and Fertilizing. -- When the windbreak is well established and cultivation no longer possible, mulching beneath the trees to about 1½ feet with partially decomposed straw from the bottom of old stacks is often beneficial. The

layer of heavy straw will smother weed growth, conserve moisture, and provide a small amount of plant nutrients. It will not, however, smother established brome and couch grass. The mulch should be applied only to those windbreaks with narrow spacing where cultivation between rows is not practised.

In Grey Wooded soil areas a light sprinkling of manure in the autumn may be beneficial. Over-application should be guarded against since it will stimulate late autumn growth with consequent frost-killing. Fertilizing is not considered necessary in the darker soils of the Peace River region.

After some years of cultivation the soil in the permanently cultivated strips may lose structure and begin to puddle and bake. Straw worked into the soil periodically will maintain structure.

Pruning. -- To induce branching, caragana plants should be pruned to within an inch or two of the ground immediately after planting. To promote further branching, two-thirds of the annual growth should be pruned for several years. Caragana may be pruned with a mower in the first 2 years, preferably in the spring when plants are dormant.

Pruning trees is advisable only to remove double tops and broken limbs. Heavier pruning will thin out the windbreak, expose the tree trunks and promote sunscald.

Fig. 7. - Pruning the caragana hedge when it is young will induce it to branch from the bottom and form dense growth. This may be done with a hay mower for the first few years after planting.

ROADSIDE PLANTINGS

This form of shelter is most valuable in providing permanent protection against snowdrifts which halt traffic during winter blizzards. Provincial highways are backsloped to permit cropping to the shoulders of the road. Municipalities are anxious to co-operate with farmers in backsloping ditches bordering roadside plantings. Alberta regulations specify that roadside plantings must be at least 125 feet from the road allowance. Therefore, over a half-mile of road the planting encloses a 7½-acre field, large enough for easy cropping. Attractive roadside

settings may be created by planting a variety of blooming and fruiting shrubs and seeding the area between the shelter and the road to a grass-legume hay mixture.

The plantings are of most value when located on the north side of east-west roads and on the west side of north-south roads. A strip of land about 10 feet wide should be summerfallowed thoroughly a year prior to the planting. This is sufficient to accommodate a single-row shelter.

Of the species that may be used caragana is probably the most durable; it should be planted 1 foot apart. Satisfactory species with blossoms or fruits, or both, are European bird cherry, pin cherry, choke cherry, saskatoon, late lilac, Hungarian lilac, Amur choke cherry and Tatarian honeysuckle. These species should be planted three to four feet apart. They may also be planted as a mixed row with caragana.

Clean cultivation should be maintained permanently on either side of the planting. A one-way disk is satisfactory for this purpose but cultivation must be shallow to prevent injury to the roots. The direction of cultivation should be alternated to prevent ridging of the soil against the trees.

It is possible for the farmer to make a permanent fence of the roadside shelter. A wire fence is stretched in the row the second year after planting. Growth of the shelter covers the wire in several years and lends permanent support after the posts have rotted.

Field shelters may be made in the same manner as outlined for roadside plantings. Caragana alone may be preferable although mixed plantings may also be used. On farms where field shelters are considered desirable, three shelters per quarter-section are suggested. This would fit into a farm plan using a 6-year rotation.

Precautions must be maintained against stubble and runaway fires which may cause serious damage to roadside plantings and field shelters.

AVENUE PLANTINGS

Farm driveways can be attractively flanked with broad-leaved or evergreen trees. Since the driveway is usually in a protected or semi-protected location, a wider choice of trees is available. The following kinds are suggested:

Beaverlodge Elm. -- A very hardy, grafted form of the American elm selected at the Beaverlodge Farm; quick growing and long lived; mature height 30 feet.

Burr Oak. -- A tall, straight-growing, graceful tree; has not shown winter injury at Beaverlodge; grows to 30 feet.

Griffin Poplar. -- Quick growing and particularly attractive for its pyramidal form, somewhat like the Lombardy poplar; many small, willowy branches; grows to 40 feet.

Ohio Buckeye. -- Related to the horse chestnut; low-headed, symmetrical tree attractive in all seasons; grows to 18 feet.

Paper Birch. -- Native; attractive the year round.

Species used in the main shelters are also well suited for use as avenue trees.

The trees should not be planted so closely that they hinder drying of the driveway following wet weather. A spacing of 20 feet between trees is suggested. Where the Beaverlodge elm, green ash, burr oak or Ohio buckeye are used it is suggested that the trees be planted at 15-foot intervals, every second tree being a Griffin poplar. The poplar is quick growing but short lived and may be removed later to make room for the other species.

A cultivated strip should be maintained on both sides of the trees.

SOURCES OF TREES

Certain species of trees and shrubs for use in farm windbreaks only, may be obtained free of charge or at nominal cost from various Government Departments. Requests should be made well ahead of planting and preferably a year in advance. The distribution policy of the Canada Department of Agriculture is outlined in Circular No. 1, obtainable from the Forest Nursery Station, Indian Head, Sask.

Commercial Nurseries

Various kinds of windbreak plants may be purchased from commercial prairie nurseries. A list of these nurseries may be obtained on request from the Experimental Farm, Beaverlodge, Alta.

SOURCES OF OTHER INFORMATION

Planting. -- Bulletins on how to plan and plant windbreaks may be secured from the Forest Nursery Station, Indian Head. Information for tree planters may also be obtained from provincial departments and local District Agriculturists. Answers to specific tree planting problems may be obtained by writing to the Experimental Farm, Beaverlodge, or to the District Agriculturist.

Insect Pests. -- The yellow-headed spruce sawfly is the most pestiferous of insects attacking windbreaks in the Peace River region. Other conifer pests are the larch sawfly and the spruce spider mite. Aphid and caterpillar infestations sometimes occur on deciduous trees. Information on the control of insect pests of windbreaks can be obtained from the Forest Biology Laboratory, Indian Head, or from the Experimental Farm, Beaverlodge.

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